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9. ABSTRACT

This report presents the methodology of a study designed to analyze agricultural development problems at the farm level in southern Brazil. The research areas include: (1) the role of capital in agricultural development; (2) the relationship of type of farm and farm size to labor and power requirements on farms; and (3) the relationship of management level to capital use intensity and productivity. Descriptive data on 954 farms representing a cross-section of types of farming regions in southern Brazil are presented in this report. The data show that individual farms vary widely in several characteristics. Farm sizes range from a few hectares to several thousands of hectares. Technology levels on neighboring farms may vary from hand methods to the most modern of mechanized power units. Differences in the level of use of other forms of technology are equally apparent. Market orientation varies from subsistence-oriented farming to highly commercialized agricultural production units. Farm investment and income patterns show similar differences. External sources of capital used by farm operators are principally government oriented. This indicates a dependence of farmers on government for investment capital. Thus government may be able to introduce desired changes in the capital structure of agriculture. However, the fact that government credit is closely tied to subsidized interest rates may indicate a general lack of profitability of additional capital in agriculture.

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**An Analysis of Agricultural Development Problems
At The Farm Level - Southern Brazil**

Methodology and General Farm Description

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August, 1968

**Agricultural Finance Center
Department of Agricultural Economics and Rural Sociology
The Ohio State University**

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FOREWORD

The Agricultural Finance Center of the Ohio State University through a Contract with the United States Agency for International Development is conducting a research project entitled "Analysis of Capital Formation and Utilization in Less Developed Countries". The general objective of the overall project is to produce detailed information useful in the allocation of agricultural development capital and in the organization of agricultural financing programs designed to accelerate the production of food, capital formation and economic growth.

This report, presenting the methodology and general farm description for a detailed farm level study carried out in Brazil in 1966, is the first of a series of publications investigating capital productivity and use at the farm level in Brazil. Subsequent reports will treat specific problem areas.

The study in Brazil was sponsored jointly by the Central Bank of Brazil, USAID/Brazil, and the Ohio State University. Many institutions and individuals collaborated in various parts of the data collection phase of this study. The Institute of Economic Studies and Research in the Faculty of Economics at the Federal University of Rio Grande do Sul in Porto Alegre, The Institute of Research and Economic Studies in the Faculty of Economics at the Federal University of Santa Catarina in Florianopolis, and the Department of Agricultural Economics at the University of Sao Paulo located in the Agricultural School at Piracicaba all provided staff and facilities for doing much of the field work and coding of the data. Contract teams for the University of Wisconsin in Porto Alegre and The Ohio State University in Piracicaba provided valuable assistance in early phases of the study.

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**AN ANALYSIS OF AGRICULTURAL DEVELOPMENT PROBLEMS
AT THE FARM LEVEL - SOUTHERN BRAZIL**

Methodology and General Farm Description

Norman Rask*

Substantial improvement in the output from the agricultural sector is an important goal of most less developed nations. Greater efficiency in the organization and use of existing resources and the provision of additional outside resources in terms of technological inputs are considered necessary to stimulate rapid growth in agricultural production. Often, both capital and management are thought to be necessary components of the package of new technological inputs. Others feel that "traditional economies" through a long process of trial and error in a static growth environment have achieved optimum resource allocation at the farm level and that new technology is the only means of increasing agricultural output. In this regard input-output price relationships, unfavorable to additional investments in agriculture have received increasing attention in recent years. Attention is also focused on barriers to further development that are inherent in various forms of resource ownership and control.

A thorough examination of the organization of agricultural production in developing countries reveals a far more complex situation than is generally acknowledged. Development covers a long continuum between "traditional" and "development". The agriculture of any single

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developing country does not all operate at one level of development, nor does it progress smoothly along the development path. Rather, various segments of agriculture within a country often will be located at distinctly different stages of development. Thus, instead of presenting a homogeneous situation, the agricultural sector is often very heterogeneous, a situation that presents the development planner with complex problems. A fundamental understanding and appreciation of this diversity and the manner in which agriculture responds to and demands differential approaches to development is essential.

The purpose of this study, is to document the diversity in the organization of individual agricultural units in southern Brazil and to investigate specific farm level development problems.

Agricultural Development Policies

The production process in agriculture takes place on a multitude of individual farm units. Each of these units has a basic set of production resources; land, labor and capital which are combined by the management process in a specific manner for producing agricultural output. The decision about how these resources are combined is largely individual and depends on the farm operator's goals and on the relative quantity and characteristics of the resources available to him. In most instances, the environmental context, including tradition and persuasive government policy comprise important parameters for decision making. To be effective, however, agricultural policy, designed to increase the level of agricultural output, must be cognizant of the limitations and possibilities imposed by these farm level characteristics.

A common concept, which has often dictated agricultural development policy, is that capital is the most limiting of the basic resources available to farmers in developing countries. Lack of capital is thought to be the primary cause of low labor and land productivity. Further, these low levels of production result in low levels of income, which in turn leave no surplus above necessary consumption for which the farmers may, by saving, accumulate sufficient quantities of internally generated capital. Thus farmers are caught in a vicious cycle from which they cannot lift themselves to higher levels of productivity unless supplied with injections of outside capital. This is the assumption upon which many of the programs for stimulating farmer use of additional capital inputs are based.

In many cases, it is further assumed that farmers cannot take advantage of or do not perceive of the highly productive nature of external capital. Thus, low interest rates, supervision and free technical assistance are considered necessary to induce farmers to use external capital. Implicit in these assumptions is the fact that farm operators are perhaps not strongly economically motivated.

An alternative explanation of farmers' general reluctance to use off-farm inputs to increase agricultural production is concerned with the general economic environment facing farm producers (8). General development policies that place a low economic value on farm production, and hence make agriculture not sufficiently profitable to warrant additional investment, are considered responsible. Taxing of agricultural exports, low consumer prices and import duties on agricultural inputs are all policies that serve to perpetuate a situation of underpricing of agricultural production and overpricing of farm inputs. This explanation suggests that the economic environment within which a commercial agriculture must operate may not stimulate the use of additional capital inputs even if they do result in substantial increases in physical output. It might further suggest that farmers are economically rational in their hesitancy to commit additional capital resources to agricultural production.

These are two quite different explanations of the observed low rates of capital formation, productivity and growth in the agricultural sectors of developing countries. If, in fact, the economic environment is not conducive to the use of additional capital, much of the

current emphasis in this direction can be expected to meet with only token acceptance by the farmers and then only if capital use is subsidized sufficiently to make it profitable.

The problem of inflation adds another dimension to the economic environment within which a farmer must make capital investment decisions. Investments as a hedge against inflation, might take precedence over productive investments during an inflationary period. Also, the process of inflation may further distort an already unfavorable input-output price relationship at the farm level and lead to investment decisions based on short run rather than long run planning.

The manner in which the land resource is controlled and operated is another area often cited as a reason for low productivity and thus as a bottleneck to growth in the agricultural sector. While policies to ameliorate tenure problems are often motivated by social reasons, they do have significant production implications. Lack of security in land resource control is cited as a reason for few permanent improvements on tenant operated farms. Cost sharing arrangements between landlord and tenant lead to low level utilization of non-farm inputs. Extremes in farm size result in either underemployment of the labor resource on small farms or underutilization of the land resource on large farms. Farm size also limits the type and intensity of certain capital inputs. The question of appropriate power units is heavily dependent on farm size.

A final area of concern with agriculture development relates to the farmer's ability to efficiently use new technology. It is often

felt that low levels of education, coupled with a deep commitment to established systems of farming, poorly equip a traditional farmer to make the necessary adjustments in the organization and operation of his farm unit. Thus an infusion of management must proceed or accompany the use of new technological inputs. Various forms of supervised credit systems in many developing countries are a testimonial to this concern. Yet, several farm level studies have demonstrated that in many areas there are farmers who experience levels of productivity well above the average, even 2 or 3 times the average (2, 3, 5, 7). This poses an interesting dilemma for agricultural policymakers. Should limited funds be concentrated on costly, long-term, efforts to increase the general level of management ability among farmers or should capable managers be identified and encouraged to move even further beyond the level of their neighbors? Again this is a question heavily involved with social and political as well as economic consideration. However, the production alternatives should be clearly understood if intelligent decisions are to be made in the allocation of development funds.

Purpose

The formulation of meaningful hypothesis, theories and policies applicable to agricultural development hinge on an intimate knowledge of the structure and processes in the agricultural sector. The general purpose of this study is to document the variability that exists in agriculture in less developed countries and to examine in depth problems at the farm level relating to agricultural development. The setting for these studies is the agricultural sector of southern Brazil.

The present report presents descriptive data on 954 farms from a cross section of type of farming regions in southern Brazil. A series of future farm level studies, utilizing these data are delineated. These individual studies, will treat particular development problems in depth and will be reported in subsequent publications. Specific research areas to be treated include:

1. The Role of Capital in Agricultural Development
 - (a) The determination of high return farm inputs.
 - (b) Capital formation on farms, including a study of consumption and savings by farm families.
 - (c) Utilization of external capital (credit) by farmers.
 - (d) The economic environment facing farmers including a study of relative prices and inflation.
2. Tenure and Farm Size
 - (a) Relationship of type of farming and farm size to labor and power requirements on farms.
3. Management
 - (a) Relationship of management level to capital use intensity and productivity.

PROCEDURE

This report is organized in the following manner. The general methodological areas of term definition, area selection and sampling procedure are treated first. Specific methodological considerations however, concerning organization of data, farm groupings, income and farm type definition, etc., are included in the appropriate data description sections. For the purpose of presentation, the data are grouped in two basic forms, by geographical area and by farm type. Farm size, tenure and farm type are discussed first by geographical area. This is followed by a description of land use, labor supply, and financial summaries including investment, farm income and credit use by farm type.

The final section of this report contains a brief description of each of several analytical farm level studies that will be the subjects of future reports.

Terms Defined

- New Cruzeiro (NCR\$) - The new cruzeiro is the current monetary unit of exchange in Brazil. At the time of the study, the "old cruzeiro" was still in use. The financial data reported here has been translated into new cruzeiro equivalents. The exchange value of one new cruzeiro in 1965 would have been approximately \$.50; or alternatively, one dollar would have been equal to two new cruzeiros.
- Hectare - A hectare is a land measure equal to 2.47 acres.
- Kilogram - A kilogram is a weight measure equal to 2.2 pounds.
- Município - A município is a political subdivision equivalent to a county in the United States.

Area of Study

The setting for this study is the country of Brazil in South America. Brazil is an immense country that extends from the temperate zone of the southern hemisphere, crossing the Equator near the Amazon River and extending into the tropical zone of the northern hemisphere. It is a country that occupies half of the land area of South America. Brazil ranks fifth among countries of the world in territorial extension and has an estimated population in excess of 80 million people. Because of its extreme size and diversity in climate and land capabilities, only a part of Brazil was selected for this study.

The area of southern Brazil encompassing the four southernmost states of Sao Paulo, Parana, Santa Catarina, and Rio Grande do Sul was selected as the study area. These four states occupy 10 percent of the total land area of Brazil and include in their boundaries 35 percent of the Brazilian population including the largest city in Brazil, Sao Paulo. Southern Brazil is bordered on the east by the Atlantic Ocean, on the south by the country of Uruguay, on the west by Argentina and Paraguay and on the north and west by other states of Brazil. This area is located principally in the temperate zone of the southern hemisphere with a small part of the state of Sao Paulo lying in the tropical zone. Altitude variations coupled with favorable latitude location have allowed most tropical and temperate climate crops to be grown in close proximity.

Geographically, there are four general regions of southern Brazil: a coastal plain, a coastal mountain range, a high plateau, and an interior low level open plain. In addition within each of these geographical regions, one finds differences in agricultural development in terms of farm size, enterprise combinations, and use of technology. These differences result partly from natural conditions and partly from methods and time of settlement.

Thus, areas of small intensive mixed enterprise farms in mountain regions using traditional methods of farming can be contrasted with the same conditions under modern systems, or with large extensive farms on open land grazing or medium size farmers with the most modern of technological practices.

An important geographical feature of this area is an escarpment located near the Atlantic Ocean at an altitude of approximately 3000 feet above sea level. This escarpment is prominent along the eastern coast of each of the four southern states with the exception of the southern half of Rio Grande do Sul, where it turns inland. The escarpment is the beginning of a great plateau which is inclined from the sea to the west. The tilt of the plateau to the west has resulted in almost no major river systems on the east coast of southern Brazil. Rivers beginning near the escarpment, only a few miles from the sea, flow hundreds of miles before entering the Atlantic Ocean as part of the Platte River system in Argentina. The plateau region encompasses by far the greatest area of the four regions.

In contrast to the high plateau, there are two low level plains in this area. One is a narrow coastal plain along the atlantic coast. The other is an interior open range land area in the southern half of the state of Rio Grande do Sul.

A fourth geographical area is a mountaneous region connecting the escarpment to the low level plains.

Each of these areas has distinctive soil, topography, vegetation, and climate conditions which have resulted in different patterns of settlement and systems of agriculture.

Coastal Plain

The coastal plain is of limited agricultural significance to this area. It is generally sandy and sometimes swampy. Because of its accessibility by sea, it was one of the earlier areas to be settled. One study area, the municipio of Tubarao, in the state of Santa Catarina, is located in the coastal plain. Type of farming and farm size in Tubarao are varied, however, small farms of mixed enterprises are most common.

Coastal Mountain Region

The mountains that extend from the coastal plain to the high escarpment are composed of a series of very steep hills and valleys. The rapid increase in elevation results in substantial annual rainfall. The natural vegetation is tropical forest of deciduous trees. The soils are relatively fertile but because of topography problems do not lend themselves well to intensive cultivation or mechanization.

This area was settled by European immigrants coming to Brazil in the middle 1800's and later. Many people still retain their native language, principally German and Italian. The immigrants were settled on small farms. Most of the potentially tillable land has been cleared and presently is under cultivation. Farm subdivision is resulting in early stages of minifundia in these areas.

Agricultural production is carried on in a part subsistence, part market oriented economy and consists of essentially mixed farming: corn and beans are the most important crops; and hogs, the most important livestock enterprise. In regions close to major cities, a substantial amount of dairy products are produced on these small farms.

One survey area, the municipio of Timbo, is located in the coastal mountain range. Timbo is situated near the coast in the northern part of the state of Santa Catarina. It is the site of an older German settlement in the lower elevation of the coastal mountain range. Farms are generally small with mixed enterprises. Dairy and rice are two important activities on farms in this area.

The coastal mountain range continues inland through the middle of the state of Rio Grande do Sul connecting the southern extremity of the high plateau with the lowland plain. A second survey area in the mountain region, the Municipio of Lageado, is located here. Lageado is situated in the east central part of the state of Rio Grande do Sul and extends from the bank of an inland river to the edge of the high plateau. It is almost entirely located within the

interior mountain range that connects the low plain to the high plateau. Lageado is the site of one of the earlier German settlements (1850's) along the lowland river and a later settlement by Italian immigrants in the highlands near the plateau.

The topography is very mountainous, resulting in small farms and traditional hand labor systems of farming. Agriculture is based on a mixture of crop and livestock enterprises. Many farms are substantially subsistence oriented.

High Plateau

The high plateau is characterized by mixed areas of open plains and pine forest. Forest products have been an important source of income to this area. Where the rivers, which flow west because of the inclination of the high plain, are cut very deeply into the plateau, climatic and topographic situations and settlement patterns similar to those of the coastal mountains range are found. These interior mountainous regions were settled in the early 1900's by second and third generation descendents of Germans, Italians and other European immigrants moving from the coastal mountain range into these interior valleys. Also, the types of agricultural production found in the interior valleys are similar to those of the coastal mountain range.

The open plain of the plateau was the first area settled for agricultural purposes in these southern four states. It was settled in large estates for the production of beef cattle.

The present agricultural production is still predominately livestock carried on under reasonably large farm situations. In some areas, especially in the southern part of this high plateau, farmers have started to adopt methods of mechanized grain production, principally for wheat and soybeans. Important specialty crops, such as coffee and sugar cane are produced in the northern areas of the plateau in the states of Parana and Sao Paulo. The southern extremity of the plateau ends in the middle of the state of Rio Grande do Sul. The transition from the high plateau to the low plain area of Rio Grande do Sul again is an area similar to the coastal mountain range, it extends across the center of Rio Grande do Sul, from east to west, gradually diminishing as the altitude of the high plateau decreases toward the west.

Four study areas were selected from the plateau. Ibiruba and Carazinho near the southern extremity of the plateau in the state of Rio Grande do Sul, Concordia, located in Santa Catarina, and Itapentininga in the state of Sao Paulo each represent a different but important segment of the agriculture of the plateau region.

Ibiruba is located near the geographical center of the state of Rio Grande do Sul. The predominate elevation of 2000 feet above sea level places it on the escarpment at the southern tip of the plateau. It is a transition area between the plateau and the inland mountain area. Ibiruba was settled by second and third generation immigrants, principally German, migrating from areas such as Lageado in the early 1900's. The topography is steeply rolling.

Farms are small to medium in size with a predominance in the 20 to 50 hectare range.

The agriculture in Ibiruba is mixed with corn and hogs as the predominate crop and livestock enterprises. Farming methods are progressive in relation to the average small farm areas.

Carazinho is located near Ibiruba, but is on the plateau proper. The topography is rolling. This area was first settled in large cattle ranches. It has recently undergone a partial transition from traditional extensive cattle grazing to highly mechanized wheat, flax and soybean production. The farms are medium to large. Due to the transitional nature of the agriculture, systems of farming run the gamut from traditional to the most modern of mechanized units. Also, because of the high cost of mechanization, and reluctance on the part of traditional cattlemen to shift to more intensive land use, different tenure systems have evolved. Initial impetus for change was given by professional or business people in the city who purchased machinery and rented land from cattlemen for the production of wheat.

The introduction of mechanization for the purposes of wheat production, and the resulting cultivation of land has also led to the use of these machines for the establishment of improved pastures for cattle grazing.

Concordia is situated along the north bank of the Uruguay River which forms the boundary between the states of Santa Catarina and Rio Grande do Sul. It is located in an area of steep hills and valleys about midway (east to west) across the state of Santa Catarina.

Similar to Ibiruba, Concordia was settled by later generation European immigrants and its agricultural economy is chiefly dependent on corn and hogs. Farms are small to medium in size and generally progressive. A local packing plant is attempting a partially integrated poultry meat production system on some farms. Both turkey and chicken products are shipped by air to the Sao Paulo market.

Itapetininga is located at the southern edge of the old coffee area in the south central part of the state of Sao Paulo. Farming is varied, with a broad range of farm sizes. Principal crops are corn and sugar cane. Livestock enterprises center around dual purpose cattle, with both dairy and beef as important sources of income.

Lowland Plain

The lowland plain of the southern half of the state of Rio Grande do Sul is an open grassland area which like the high plateau was settled by Spanish and Portuguese settlers interested in cattle raising. The type of agriculture is mixed sheep and cattle production on large farms using traditional ranching practices.

The municipio of Alegrete was chosen to represent this area. It is located in the southwestern part of Rio Grande do Sul. The agriculture is based almost exclusively on extensive cattle and sheep ranching. Some irrigated rice is produced along the principal waterways. Farms are relatively large, generally ranging in size from several hundred to several thousand hectares.

In summary, the present form of agriculture of southern Brazil is a result of the distinct geographical and climatic base found in each area, and is partly dependent on the settlement patterns which have evolved over time. Two commercially important types of farming can be identified. First, in the open area on the high plateau and on the low grassland areas of Rio Grande do Sul is found an extensive cattle and sheep grazing agriculture based on large farms. Second, in the more rugged mountain regions mixed farming of various kinds with a predominance of corn and hogs is found on medium and small farms. Within each region and in transition areas between these two general types of farming regions are found smaller areas of specialty crops, such as coffee, rice, tobacco, sugarcane, wheat, and soybeans.

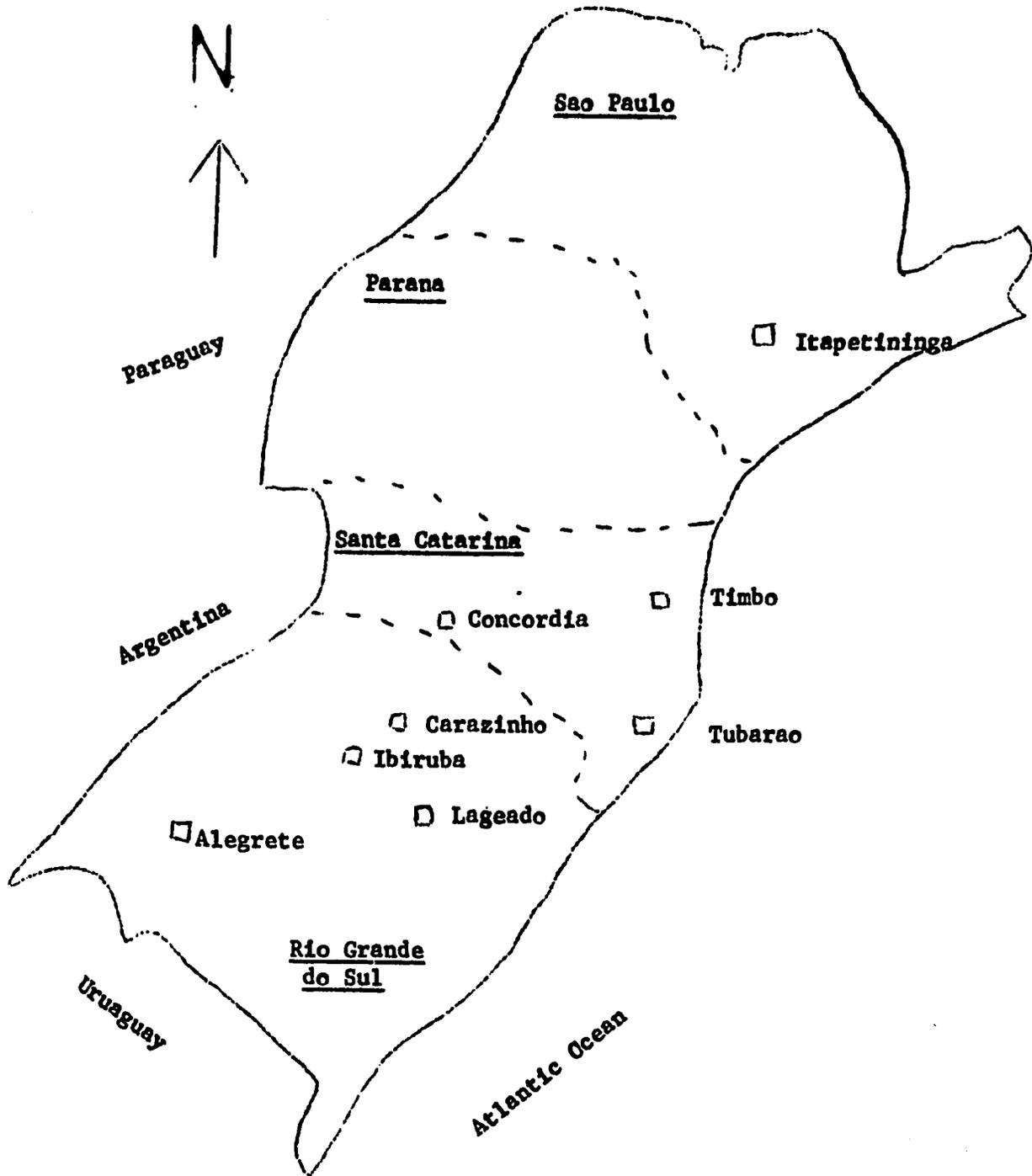


Figure I - Southern Brazil, including the states of Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul.

Sampling Procedure

The basic objective in establishing the sampling procedure was to provide a sufficient number of observations from each of several distinct type of farming regions to provide a valid basis for comparisons both within and between regions. Further, the primary interest was not limited to using the data for a quantitative description of each particular area, but rather as indicative of the characteristics of a wider region that could be generalized beyond the immediate area studied. Thus, the final sample selection included a careful determination of general regions, selection of small representative areas within each general region and finally the individual farm selection within the area.

For administrative purposes, the area selection was done on a municipio (county) basis. However, political boundaries do not always coincide with natural or type of farming boundaries. Therefore, when one or more of the districts within a selected municipio was atypical for the general characteristics of the region under study, it was eliminated from the sample population.

A final restriction on the sample population was made by establishing farm size limitations for each of the municipios studied. A maximum limit was established to avoid the inclusion of one or two extreme observations in each area which would be atypical and need to be treated as a special case studies. The lower limit eliminated those farms too small for commercial operation of the particular type of farming under study.

Minimum and maximum size units established for each area were as follows:

<u>Município</u>	<u>Number of Hectares</u>	
	<u>Minimum</u>	<u>Maximum</u>
Alegrete	150	5,000
Carazinho	20	1,000
Ibiruba	5	200
Lageado	5	100
Concordia	5	100
Tubarao	3	100
Timbo	5	100
Itapetininga	5	1,000

With the sample population so defined, individual observations were chosen on a random cluster sample basis from the property rolls in each município. Each farm selected from the roll served to identify a cluster of 3 farms, the one selected and two additional neighboring farms. The two additional farms were chosen on a pre-determined basis, excluding possibility of contiguous borders with properties already selected. Common boundary farms were excluded in order to reduce the possibility of choosing two relatively identical situations resulting from family subdivision of a particular farm unit.

DATA DESCRIPTION

General descriptive information on the 954 farms studied is presented in this section. Two major farm classifications are used, geographical area and farm type. First, a brief description of size frequencies, tenure arrangements, and type of farming is presented by municipio. A more detailed description of the farms is then presented based on farm type. Financial information including cash-flows, income measures and investment; land and labor utilization, credit use, and other miscellaneous information is considered by farm type. Analysis of specific problem areas is deferred to subsequent publications.

Size of Farm

Individual farm sizes ranged from a low of 3.0 hectares, the lower limit established in the municipio of Tubarao to a high of 9,528 hectares in the extensive range land area in the municipio of Alegrete. The sample, drawn from property rolls, included only land owned. Thus, in some cases the actual size of operating units was outside of the determined limits for sample selections because of renting practices. Five of the eight municipios chosen for study were representative of the small farm regions, hence a majority of the farm sizes are concentrated in the 10 to 50 hectare range. However, there are sufficient numbers in all size categories to allow a comparison of the characteristics and performance of farms over a wide range of sizes (Table 1).

Small farm agriculture is adequately represented with farms of 5 to over 50 hectares. These can also be contrasted with medium size farms of up to 500 hectares in the municipio of Carazinho, where cropping systems are somewhat similar. Medium and large farms are found in the municipio of Alegrete, however, systems of open range land grazing represent a substantially different type of agriculture from that predominating in other regions.

Table 1

Farm Size Distribution by Municipio
954 Farms - Southern Brazil - 1965

Number of Hectares	All	M u n i c i p i o							
		Rio Grande do Sul				Santa Catarina			Sao Paulo
		Alegrete	Carazinho	Ibiruba	Lageado	Tubarao	Concordia	Tiubo	Itapetininga
3.0 - 4.9	13	-	-	-	1	12	-	-	-
5.0 - 9.9	78	-	-	2	27	32	5	9	3
10.0 - 14.9	120	-	-	16	28	23	26	21	6
15.0 - 19.9	111	-	-	10	20	13	20	30	18
20.0 - 29.9	200	-	21	37	30	13	37	42	20
30.0 - 49.9	159	-	23	40	15	12	28	20	21
50.0 - 99.9	117	1	24	16	5	7	17	10	37
100.0 - 199.9	42	11	14	3	1	-	-	-	13
200.0 - 499.9	55	25	16	-	-	-	-	-	14
500.0 - 1499.9	32	22	10	-	-	-	-	-	-
1500.0 +	27	26	1	-	-	-	-	-	-
Total Farms	954	85	109	124	127	112	133	132	132

Tenure

The principal tenure form in all areas of study was operation and ownership of the farm by the farm family. Various forms of renting, share cropping and partnership arrangements are combined or coexist with this basic form (Table 2).

Only two percent of the farms interviewed were renting all of the land they operated. These renters were concentrated in the large farm areas of Carazinho and Alegrete, where up to 10 percent of the farms were rented. At the other extreme, over two thirds of the farms were classified as owner-operator with no renting of additional land. Family partnerships added an additional 8 percent to this group. In the small farm areas, the combined classification of owner-operator with no land rented and family partnerships accounted for up to 92 percent of all farm units studied.

Share cropping other than family partnerships was evident to some degree on 14 percent of the farms. Share cropping was most prevalent in the municipio of Itapetininga in the state of Sao Paulo where over one-third of the farms employed share croppers. Very little share cropping was observed on the farms interviewed in the range area of southern Rio Grande do Sul (Alegrete).

Table 2

Farm Tenure Arrangements by Municipio
954 Farms - Southern Brazil - 1965

Tenure arrangement	M u n i c i p i o								
	All	Rio Grande do Sul			Santa Catarina			Sao Paulo	
		Alegrete	Carazinho	Ibiruba	Lageado	Tubarac	Concordia	Timba	Itapetininga
	(number of farms)								
<u>Individual operator</u>									
Rent all land	21	9	4	2	1	1	1	2	
Combination rent and own:									
Rent more than 50%	36	10	13	3	2	5	-	3	
Own more than 50%	130	19	9	14	11	24	18	25	
Own all land	679	34	59	84	105	72	108	96	
<u>Family partnership</u>	77	13	20	19	8	7	4	6	
<u>Other</u>	11	-	4	2	-	3	2	-	
All farms	954	85	109	124	127	112	133	132	
Farms with share croppers*	134	4	15	15	11	20	15	7	

* Farms with share croppers is not an independent category. It is listed here to show the prevalence of this practice on farms in the study areas.

Farm Type

The choice of sample areas was based on type of farming regions. However, there was sufficient diversity within most regions, especially in the small farm areas to warrant type classification of individual farms. Initial classification was made on the basis of the relative importance of various farm enterprises measured in terms of annual farm cash income. Three general types of income were used in the classification: (1) livestock income, (2) crop income, and (3) other cash income (principally non-farm income),

The classification was designed to divide the farms into three farm type groups: general, specialized, and other. First, those farms on which the other cash income (item 3 above) was equal to 50 percent or more of the cash income originating from livestock and crop sales were classified as "other". The remaining farm operations were classified as either general or specialized farms based on the relative amount of cash receipts from livestock and crop sales. The specialized farms are those receiving 60 percent or more of their cash income from one commodity type.

Finally, some additional regrouping was done to further characterize significant differences and similarities within and between specific farm types. Crop farms were divided into mechanized and non-mechanized, and extensive cattle and sheep farms under range conditions were combined into one category.

The following nine groupings were used in the final classification.
(Table 3)

Specialized Livestock Farms

(1) Range livestock farms - sixty percent or more of the annual cash income from the sale of crops and livestock is from the sale of cattle and sheep including animal products such as wool. Further, each farm contains 100 or more hectares of pasture land. A total of 79 farms are included in this classification. All but 10 are located in the large extensive grazing area represented by the municipio of Alegrete in southern Rio Grande do Sul.

(2) Hog farms - sixty percent or more of the annual cash income from the sale of crops and livestock is from the sale of hogs. A total of 222 farms are included in this grouping. This is the largest single type of classification. The farms are located principally in the small farming region in the sampled municipios of Ibiruba, Lageado and Concordia.

(3) Dairy farms - sixty percent or more of the annual cash income from crops and livestock is from the sale of dairy products. This classification contains 66 farms and is distributed over the geographical areas represented in the study. Dairy farms are listed here as a specialized group on the basis of cash sales. However, it is one of the most diversified groups in terms of organization of the specific dairy enterprise. Almost all farms have some dairy animals and sell some dairy products during the flush production season. Thus, subsistence farms with little cash sales may enter this classification simply because they have no other major source of cash income.

At the other extreme some large extensive farm operations have dual purpose cattle. The true specialized dairy farms organized for the commercial production of milk are necessarily located near the consumption centers because of problems with adequate refrigeration and transportation facilities in interior areas.

(4) General livestock farms - sixty percent or more of the annual cash income from crops and livestock is from livestock. However, the farms meet none of the conditions necessary to be included under the three specialized groups mentioned before. There are 152 general livestock farms.

Specialized Crop Farms

(5) Mechanized crop farms - sixty percent or more of the annual cash income from crops and livestock is from crops and each farm has at least one tractor. There are 43 mechanized crop farms located principally in the municipio of Carazinho. The mechanized crop farms produce wheat, corn, soybeans and flax as the principal crops. Double cropping with wheat, a winter crop, and one or more of the other three principal crops mentioned above is a common practice.

(6) Extensive crop farms - sixty percent or more of the annual cash income from the sale of crops and livestock comes from the specific crops of corn, wheat, soybeans, and flax which are produced with non-mechanized equipment (farms do not have mechanical power).

This group contains 53 farms and includes a cross section of geographical areas with principal concentration in the municipios of Carazinho, Ibiruba and Itapetininga.

(7) General crop farms - sixty percent or more of the annual cash income from the sale of crops and livestock comes from the sale of crops. However, the farms meet none of the conditions specified for classifications 5 and 6. There are 116 farms in this group. The principal sources of cash income are tobacco, mandioca and rice. They are located primarily in the small farm region along the east coast in the municipios of Tubarao and Timbo.

Non-Specialized Farms

(8) General farms - more than 40 but less than 60 percent of the annual cash income from the sale of crops and livestock is from the sale of livestock. This group contains the farms that are neither specialized crop nor specialized livestock but are diversified crop and livestock farms. A total of 90 farms in this category are distributed rather evenly over the geographical regions.

(9) Other farms - "other cash income" is equal to 50 percent or more of the annual cash income from the sale of crops and livestock. A total of 133 farms, principally from the municipios of Carazinho, Ibiruba, and Itapetininga are included in this category.

A breakdown of farm types by municipios is given in Table 3.

Table 3

Type of Farm Classification by Municipio
954 Farms - Southern Brazil - 1965

Type of farm	M u n i c i p i o									
	Total	Rio Grande do Sul				Santa Catarina			Sao Paulo	
		Alegrete	Carazinho	Ibiruba	Lageado	Tubarao	Concordia	Timbo	Itapetininga	
		(number of farms)								
<u>Specialized livestock farms:</u>										
Range livestock	79	69	4	-	-	-	-	-	6	
Hog	222	-	11	60	41	-	99	7	4	
Dairy	66	-	6	3	7	13	-	21	16	
General livestock	152	-	6	18	41	8	15	19	45	
<u>Specialized crop farms:</u>										
Mechanized crop	43	4	27	-	-	7	-	4	1	
Extensive crop	53	-	18	11	4	3	2	-	15	
General crop	116	-	-	12	13	34	3	51	3	
<u>Non-specialized farms:</u>										
General	90	2	15	12	13	14	5	12	17	
Other	133	10	22	8	8	33	9	18	25	
Total	954	85	109	124	127	112	133	132	132	

Land Use

The farms studied display a great diversity in the selection and combination of specific crops grown (Table 4). This is evident both in the differences between and within group averages as well as within many of the individual farm operations. Diversity in cropping patterns results from several basic reasons. First, the great disparity in farm size and technological orientation provides a cross section of farms from substantially subsistence to highly commercial agricultural units. Subsistence farms, in providing for a significant portion of the family's sustenance must produce a variety of crops both for direct consumption and for animal feed for the various forms of livestock found on these farms. A second reason for lack of specialization in the utilization of crop land is the high degree of uncertainty associated with the production and marketing of agriculture crops. Diversification reduces the risk associated with dependence on a single crop.

Intensity of land use is a third factor. Small farms are able to use the land more intensively by intertilling certain crops and in double cropping a part of the land by planting crops that mature in different seasons. Double cropping is also practiced on the larger farms, most notably with wheat which is planted in the fall and harvested in the spring.

Corn is the most important crop, both in terms of number of farms planting corn and in the acreage devoted to it.

On the livestock farms it occupies more than one-half of the total land cultivated. It is used for both human and animal consumption on the farm and serves as an important source of cash income for many farms. It is the principal feed for the fattening of hogs.

Wheat and soybeans are both commercially important as sources of cash income on many of the farms studied, especially in the mechanized crop areas where they are well suited to modern production methods. They are not important sources of animal feed, though soybean oil meal is repurchased by some hog farmers as a protein supplement.

Rice production in the regions studied is limited to areas where irrigation facilities are readily available. Thus, its production is important locally but not throughout the regions studied. Mandioca (cassava), is an important animal feed on most farms and is grown commercially on some farms, especially in the areas of poorer soils.

Table 4

Land Ownership and Use by Farm Type
519 Specialized Livestock Farms -- Southern Brazil -- 1965

Land use	Farm type			
	Range livestock farms	Hog farms	Dairy farms	General livestock farms
	(number of hectares)			
Land owned	973	33	42	69
Land operated	1,358	32	44	69
Land cultivated*	20.0	12.2	7.2	13.8
Pasture land	1,278	8	28	43
Cropping pattern				
Corn	11.4	7.4	4.6	8.3
Wheat	.7	1.5	.3	1.3
Soybeans	---	1.2	.4	1.9
Rice	5.9	.2	.1	.1
Mandioca	.2	1.6	.9	.9
Other	.9	.1	.1	.2
Forage	.1	.7	.6	.5
Home use	<u>1.1</u>	<u>.8</u>	<u>.9</u>	<u>1.0</u>
Total crops*	20.3	13.5	7.9	14.2

* Differences in the average values between hectares of land cultivated and hectares of land in specific crops is due to the practice of double cropping, especially with wheat which is winter crop.

Table 4 (Cont'd.)

Land Ownership and Use by Farm Type
212 Specialized Crop Farms -- Southern Brazil -- 1965

Land use	Farm type		
	Mechanized crop farms	Extensive crop farms	General crop farms
	(number of hectares)		
Land owned	216	50	23
Land operated	360	50	23
Land cultivated*	146.1	21.5	8.0
Land in pasture	162	17	5
Cropping pattern.			
Corn	36.0	15.2	2.3
Wheat	76.1	4.9	.4
Soybeans	35.3	3.8	.4
Rice	9.1	.1	1.6
Mandioca	.8	.7	1.1
Other	45.1	1.8	1.4
Forage	.7	.3	.8
Home use	<u>1.5</u>	<u>.7</u>	<u>.4</u>
Total crops*	204.6	27.5	8.4

* Differences in the average values between hectares of land cultivated and hectares of land in specific crops is due to the practice of double cropping, especially with wheat which is a winter crop.

Table 4 (Cont'd.)

Land Ownership and Use by Farm Type
223 Non-Specialized Farms -- Southern Brazil -- 1965

Land use	Farm type	
	General farms	Other farms
	(number of hectares)	
Land owned	52	102
Land operated	77	105
Land cultivated*	17.2	17.5
Pasture land	49	70
Cropping pattern		
Corn	9.4	6.8
Wheat	4.6	1.2
Soybeans	2.2	1.4
Rice	1.0	.3
Mandioca	1.1	.8
Other	.7	5.9
Forage	.4	.4
Home use	<u>.7</u>	<u>.9</u>
Total crops*	20.1	17.7

* Differences in the average values between hectares of land cultivated and hectares of land in specific crops is due to the practice of double cropping, especially with wheat which is winter crop.

Labor Supply

The computed values for labor availability are composed of two forms of agricultural labor, farm family labor and hired labor. The value attributed to farm family labor represents the amount of productive labor available to work on the farm. It does not measure the amount of productive work performed by members of the family. On some small farms there is a redundant labor supply and this measure reflects this abundance of family labor. The estimated value is a composite of family size, age, sex, place of residence and type of farming. For example, the wife was considered to contribute one-half a man equivalent to the farm labor force on certain farm types, children were considered at various fractions of a man equivalent, etc. One man equivalent was defined as 300 days of productive labor. Hired labor was measured on the basis of days worked. A full-time hired man or 300 days of temporary hired labor were considered equal to one man equivalent.

Available family labor was the predominate source of labor supply with all farm types except for the range livestock and mechanized crop farms (Table 5). The greater use of hired labor on these two farm types results from less family labor availability because of the nature of the tasks to be performed and because many of the families live off the farm. Only one-third of the families in the range livestock group lived on the ranch, while the comparable value for the mechanized crop farms was 58 percent. All other specialized farms had from 93 to 100 percent of the families living on the farm property.

One of the reasons for establishing a place of residence in urban rather than rural areas, is to have secondary schooling available for the children. The substantially higher level of educational achievement by the operators of the range livestock and mechanized crop farms is indicative of this situation (Table 6).

Table 5
Labor Availability by Farm Type
954 Farms -- Southern Brazil -- 1965

Farm type	Labor source			
	Total	Family labor	Hired labor	
			Permanent	Temporary
			(man equivalents)*	
<u>Specialized livestock farms:</u>				
Range livestock farms	5.9	1.7	2.9	1.3
Hog farms	3.2	3.0	.1	.1
Dairy farms	3.8	2.9	.7	.2
General livestock farms	3.9	2.8	.6	.5
<u>Specialized crop farms:</u>				
Mechanized crop farms	5.1	2.2	1.8	1.1
Extensive crop farms	4.1	3.1	.4	.6
General crop farms	3.8	3.6	.1	.1
<u>Non-specialized farms:</u>				
General farms	4.0	3.2	.2	.6
Other farms	4.5	2.8	1.1	.6

* One man equivalent is equal to one permanent hired employee or 300 days of temporary hired labor. For valuation of family labor see text.

Table 6

Educational Achievement of Farm Operator by Type of Farming
954 Farms -- Southern Brazil -- 1965

Farm type	Years of schooling completed				
	Primary			Secondary	University
	0	1-2	3-5		
	(percent of group)				
<u>Specialized livestock farms:</u>					
Range livestock farms	6	17	47	14	16
Hog farms	9	19	71	1	--
Dairy farms	17	25	56	2	--
General livestock farms	14	29	56	1	--
<u>Specialized crop farms:</u>					
Mechanized crop farms	2	14	63	12	9
Extensive crop farms	20	32	46	2	--
General crop farms	16	31	53	--	--
<u>Non-Specialized farms:</u>					
General farms	18	29	52	1	--
Other farms	16	25	49	7	3

Financial Summary

Problems of double cropping and inflation raise serious methodological questions in terms of selecting an appropriate accounting period for study and in handling the inventory problems for crops, livestock and other supplies held prior to or subsequent to the determined accounting period.

Accounting Period

The calendar year 1965 was selected as the most practical accounting period. Most sales of products and input purchases are made in the later part of the calendar year. Data collection based on recall is more accurate if a majority of the sales and purchases are relatively recent transactions. When there are elements of continuous cropping, it is not possible to include all the output that results from the expenditure of a given input since any period chosen will begin and end with some crop at an intermediate stage of production. This is not a serious problem since most farms follow a fairly constant cropping pattern from year to year. However, to make sure that unusual changes had not taken place, each farmer was asked about previous cropping patterns. Thus, the possibility of a substantial change in input composition not being reflected in output was controlled.

Finally, the bunching of major sales and purchases in a short period of time reduces the effect of inflation.

Inventory Valuation

Crops are not normally held for a long period of time following harvest. Thus inventories of crops at the time of interview were largely of a transitory nature. Only crops harvested during the accounting period were considered for income purposes. The farmers were asked to allocate the total crop production among the various uses. That portion of annual production in storage and destined for sale at the time of interview was considered as crop sales. Thus crops do not appear as an inventory item.

Actual numbers for various categories and ages of livestock were taken for both beginning and ending inventories and a standard monetary value was based on average value at time of interview. This method thus, accounted for changes in inventory of livestock but did not reflect increase in value due to inflation.

Land, buildings and equipment were valued at the end of the accounting period only. Land and buildings were assumed to be maintained at current real value. For income calculation purposes the equipment was charged a depreciation rate based on average expected life and on the average rate of capital purchase. This varied from 7 to 9 percent of the ending inventory value.

Income Measures Used

Net Farm Cash Income - Net farm cash income is equal to total farm cash receipts minus farm operating expenses. Farm cash receipts include the sale or anticipated sale value of crops produced in 1965,

livestock sales, animal product sales and other farm income including work off the farm by the operator and his dependents, cash rent of land and custom machine work.

Net Farm Income - Net farm income is equal to net cash income minus machinery and equipment depreciation, plus livestock inventory change, plus perquisites. Perquisites are farm production consumed by the farm family.

Gross Farm Output - Gross output is equal to cash sales of crops, livestock and livestock products plus changes in livestock inventory, minus value of purchased livestock, plus perquisites. It is a measure of the total volume of output produced on the farm during the year.

Investment

A measure of size of farm business is the amount of investment required to finance the necessary capital inputs in the farm operation. Also of importance is the manner in which this total investment is divided among the component parts of real estate and equipping capital. Land and buildings account for approximately three-fourths of the total investment on most farms (Table 7). The notable exception is on the mechanized farm where less than one-half of total investment is included in land and buildings. On these farms equipment accounts for 36 percent of total investment. In all other farm types the investment in equipment ranges from 2 to 8 percent.

When equipment investment is expressed in terms of cultivated land a significant contrast is apparent in the production system on two similar farm types. Extensive crop farms and mechanized crop farms produce essentially the same crops - corn, wheat, soybeans, and flax yet the equipment investment per hectare cultivated is 10 times as great on the mechanized farms.

Total investment is larger on the range livestock farms, averaging NCr \$262,747 (approximately \$130,000). General crop farms are the smallest with an average investment of NCr \$11,734 (approximately \$5,800) per farm.

Table 7
Level of Farm Asset Investment by Farm Type
519 Specialized Livestock Farms -- Southern Brazil -- 1965

Investment item	Farm type			
	Range livestock farms	Hog farms	Dairy farms	General livestock farms
	(new cruzeiros)			
Livestock:				
Production	70,217	1,855	2,905	4,171
Power	<u>2,431</u>	<u>364</u>	<u>321</u>	<u>397</u>
Total livestock	72,648	2,219	3,226	4,568
Equipment:				
Mechanized	3,892	443	17	432
Animal	246	106	175	210
Manual	7	22	17	25
Other	<u>1,758</u>	<u>222</u>	<u>132</u>	<u>171</u>
Total equipment	5,903	793	341	838
Car and truck	6,214	628	429	520
Land and buildings	177,982	9,044	12,958	21,795
Total investment	262,747	12,684	16,954	27,721
Investment measures:				
Investment/hectare owned	270	384	404	402
Equipment investment/ crop hectare	N. A.	59	43	59

Table 7 (Cont'd.)

Level of Farm Asset Investment by Farm Type
212 Specialized Crop Farms -- Southern Brazil -- 1965

Investment item	Farm type		
	Mechanized crop farms	Extensive crop farms	General crop farms
Livestock:			
Production	8,959	2,262	952
Power	435	402	235
Total livestock	9,394	2,664	1,187
Equipment:			
Mechanized	33,316	98	14
Animal	104	314	121
Manual	24	13	29
Other	1,740	53	244
Total equipment	35,184	478	408
Car and truck	6,476	287	262
Land and buildings	47,507	13,422	9,877
Total Investment	98,561	16,851	11,734
Investment measures:			
Investment/hectare owned	456	337	510
Equipment investment/crop hectare	172	17	49

Table 7 (Cont'd.)

Level of Farm Asset Investment by Farm Type
223 Non-Specialized Farms -- Southern Brazil -- 1965

Investment item	Farm type	
	General farms	Other farms
Livestock:		
Production	3,618	4,691
Power	416	401
Total livestock	4,034	5,092
Equipment:		
Mechanized	1,025	831
Animal	216	165
Manual	23	15
Other	407	307
Total equipment	1,671	1,318
Car and truck	558	1,219
Land and buildings	13,995	22,588
Total investment	20,258	30,217
Investment measures:		
Investment/hectare owned	390	296
Equipment investment/crop hectare	83	74

Farm Income

Income can be measured in many ways and for many purposes. Farm income as defined in this study is the annual return to the farm family labor, management, and the capital invested in the farm business. The range in average farm income by type of farm was from NCr \$694. on the general crop farms to NCr \$6,812. on the range livestock farms (Table 8). The other livestock farm groups experienced average farm incomes of from NCr \$1,466 to 2,067 per farm. The mechanized crop farms had an average farm income of NCr \$5,679.

On most small farms, perquisites (home consumption) and positive changes in livestock inventory resulted in farm income in excess of the cash income. The larger farms, however, experienced the reverse. Substantial depreciation charges for equipment and in the case of the range livestock farms a decrease in livestock inventories resulted in farm incomes somewhat under the level of cash income.

Estimated cash outlays for living expenses were quite similar for the smaller farms and closely paralleled the value of perquisites, both values falling between NCr \$550 and 800. per farm. They were substantially greater on the larger farms.

Loan (principal) payments were somewhat less than the flow of new credit for all farm groups. This added indebtedness is partly a phenomenon of inflation which increases the monetary value of the bundle of productive inputs traditionally financed by the farmers. The great difference between inflow and repayment of

credit for the mechanized crop farms is caused principally by the timing of wheat harvest. The farms have been credited with the value of wheat harvested but many had not retired the wheat operating loans at the time of interview. This also accounts for the large positive net cash flow on these farms.

Farm cash operating expenses as a percentage of gross value of production were generally low on the small farms and higher on the larger farms indicating that as size increased, more off farm inputs were employed for a given level of production. The small farms used about one-third of their production to pay for off farm inputs. On the larger farms, the value of cash inputs ranged from 60 to over 80 percent of the gross output.

While relatively more cash inputs were necessary on the larger farms, the percentage of gross output available for market was also larger (a smaller proportion of output was consumed on the farm). The amount of output available for marketing ranged from 97 percent on the mechanized crop farms to 64 percent on the general crop farms. Again the principal determining factor is size of operation, since the absolute quantity of home consumed produce is quite stable for all farms. The small farm groups ranged from 64 to 80 percent. Some individual farm observations show a negligible quantity of produce available for market.

Table 8
Cash Flow and Income Measures
519 Specialized Livestock Farms -- Southern Brazil -- 1965

Cash or income category	Farm type			
	Range livestock farms	Hog farms	Dairy farms	General livestock farms
	(new cruzeiros)			
Crop sales	1,740	149	108	350
Livestock sales	22,899	1,544	1,251	1,817
Other farm income	616	56	30	110
Total farm receipts	25,255	1,749	1,389	2,277
Capital sales	565	39	37	345
Non-farm income	480	39	56	70
New credit	3,704	252	143	443
Total cash available	30,004	2,079	1,625	3,135
Salaries	1,896	34	37	91
Crop costs	473	58	33	101
Machine costs	1,387	70	61	95
Livestock costs	2,880	334	224	179
Livestock purchase	4,445	135	164	325
General costs	4,507	104	113	212
Interest payments	337	12	10	30
Total operating costs	15,925	747	642	1,033
Capital purchases	5,333	377	245	867
Loan payments (principal)	2,908	108	67	236
Cash living expenses	3,805	643	625	647
Total cash needed	27,971	1,875	1,579	2,783
Inventory change	- 2,931	66	+ 204	221
Depreciation	1,075	117	41	86
Perquisites	1,488	680	556	688
Net farm cash income	9,330	1,002	747	1,244
Net farm income	6,812	1,631	1,466	2,067
Gross farm output	18,751	2,304	1,935	2,751

Table 8 (Cont'd.)

Cash Flow and Income Measures
212 Specialized Crop Farms -- Southern Brazil -- 1965

Cash or income category	Farm type		
	Mechanized crop farms	Extensive crop farms	General crop farms
	(new cruzeiros)		
Crop sales	19,276	1,594	991
Livestock sales	2,010	410	206
Other farm income	660	71	39
Total farm income	21,946	2,075	1,236
Capital sales	351	45	88
Non-farm income	907	24	59
New credit	11,176	572	181
Total cash available	34,380	2,716	1,564
Salaries	1,580	66	55
Crop costs	6,065	194	97
Machine costs	3,860	29	57
Livestock costs	463	69	41
Livestock purchase	500	154	171
General costs	1,107	108	110
Interest payments	330	11	11
Total operating costs	13,905	631	542
Capital purchases	5,027	541	199
Loan payments (principal)	2,989	108	137
Estimated living expenses	2,172	579	661
Total cash needed	24,093	1,859	1,539
Inventory change	+ 576	+ 478	+ 64
Depreciation	3,694	86	50
Perquisites	756	688	610
Net farm cash income	8,041	1,444	694
Net farm income	5,679	2,564	1,318
Gross farm output	22,118	3,016	1,700

Table 8 (Cont'd.)

Cash Flow and Income Measures
223 Non-Specialized Farms -- Southern Brazil -- 1965

Cash or income category	F a r m t y p e	
	General farms	Other farms
	(new cruzeiros)	
Crop sales	1,139	456
Livestock sales	1,065	952
Other farm income	52	693
Total farm income	2,256	2,101
Capital sales	100	38
Non-farm income	74	2,002
New credit	538	627
Total cash available	2,968	4,768
Salaries	195	361
Crop costs	250	334
Machine costs	103	323
Livestock costs	171	203
Livestock purchase	285	431
General costs	236	323
Interest payments	29	45
Total operating costs	1,269	2,020
Capital purchases	451	1,034
Loan payments (principal)	258	291
Estimated living expenses	818	1,065
Total cash needed	2,796	4,410
Inventory change	+ 663	+ 320
Depreciation	191	181
Perquisites	665	590
Net farm cash income	987	81
Net farm income	2,124	810
Gross farm output	3,247	1,887

Credit Use

Credit utilization is a function of farmer demand and/or credit institution policy. It would appear that both were influential in the allocation of supplies of external capital on the farm studied. Not all farms, however, were active borrowers during the period of study. About one-half of the farmers had one or more outstanding loans during 1965. The mechanized crop farms were the most active borrowers with 88 percent of the group participating in loan activity during 1965 (Table 9). Range livestock farms were second with 66 percent of farmers showing indebtedness during the year. Both of these groups are composed of large farms.

A little less than one-third of the farms indicated no previous history of use of external capital. The remaining 21 percent of the farms had used credit in past years, but did not have loans outstanding in 1965.

There was considerable variation in the average size of loan. The hog farms had the smallest size loan NCr \$374., while the mechanized crop farms experienced average size loan of NCr \$5,174. These extreme differences are further accentuated when average amounts of new credit per active borrower are concerned for not only did the larger farms have greater size loans, they also contracted for more loans per farm. The mechanized crop farms (borrowers only) had an average new credit in 1965 of NCr \$12,700. per farm.

The allocation of agricultural credit among alternative uses and sources of financing demonstrates several important factors concerning the nature of external financing for agriculture in Brazil. First, by far the largest single source of agricultural credit is through government or semi-government sponsored agencies (Table 10). Of the 1,018 loans outstanding on these farms in 1965, over one-half were from the Bank of Brazil or state banks. The Bank of Brazil alone accounted for 43 percent of all loans. Further, the average size of loan is considerably greater from the Bank of Brazil than from other sources. Loans from individuals accounted for approximately one-fourth of all loans. Cooperatives were important in only one area, the municipio of Alegrete, where they account for 37 of the 194 loans outstanding in that municipio.

In an inflationary situation, it is difficult to acquire loans from commercial sources for long term capital financing. Yet this form of financing is needed. For example, financing for land purchase was the purpose of 45 of the loans outstanding (Table 11). This financing however was provided by individuals primarily (75 percent). On the other hand, financing for tractors and other forms of equipment was principally provided by the Bank of Brazil through a special government program for the financing of equipment acquisition.

Operating expenses accounted for more than one-third of all loans, with crop costs the most important component of this group. Personal loans included 10 percent of the total and were provided almost exclusively by private individuals.

Farmers were able to secure commercial and public credit for operating expenses, equipment and livestock purchases. They had to rely on non-institution sources for financing land transfers, home improvements and other personal loans.

Table 9

Selected Credit Use Factors by Type of Farming
954 Farms -- Southern Brazil -- 1965

Type of farming	Credit use			Average size of loan out- standing 1965 (new cruzeiros)	New credit per active borrower 1965
	Current borrowers (percent of farms)	Previous borrowers	Non- borrowers		
<u>Specialized livestock farms:</u>					
Range livestock farms	66	19	15	2,940	5,612
Hog farms	51	26	23	374	494
Dairy farms	36	35	29	427	397
General livestock farms	45	21	34	821	984
<u>Specialized crop farms:</u>					
Mechanized crop farms	88	5	7	5,174	12,700
Extensive crop farms	45	25	30	863	1,271
General crop farms	57	9	34	391	318
<u>Non-specialized farms:</u>					
General farms	51	22	27	853	1,055
Other farms	42	26	32	1,300	1,493
<u>All farms</u>	51	21	28	1,025	2,135

Table 10
Number of Outstanding Loans by Municipio
and Source of Financing
954 Farms -- Southern Brazil -- 1965

Município	Source of financing					
	All	Bank of Brazil	State bank	Private bank	Individual	Other
(number of loans)						
Rio Grande do Sul:						
Alegrete	194	98	4	37	11	44*
Carazinho	158	110	14	16	17	1
Ibiruba	143	25	34	27	49	8
Lageado	93	31	1	16	42	3
Santa Catarina:						
Tubarao	90	55	5	4	16	10
Concordia	140	56	7	10	62	5
Timbo	97	16	42	3	34	2
Sao Paulo:						
Itapetininga	103	43	40	2	7	11
Total	1,018	434	147	115	238	84

* Of the 44 other loans in the municipio of Alegrete 37 are from cooperatives.

Table 11

Number of Outstanding Loans by Loan Purpose
and Source of Financing
954 Farms -- Southern Brazil -- 1965

Purpose of loan	Source of financing					
	All	Bank of Brazil	State bank	Private bank	Individual	Other
	(number of loans)					
<u>Land and buildings:</u>						
Land purchase	45	1	3	3	34	4
Land improvement	12	--	5	4	2	1
Buildings	64	30	10	4	11	9
Home	25	6	--	--	17	2
<u>Equipment:</u>						
Tractor	23	19	--	1	3	--
Car-truck	12	4	1	--	7	--
Other and repair	44	25	4	3	12	--
<u>Livestock:</u>						
Work animals	21	5	6	5	4	1
Other	125	56	20	31	16	2
<u>Operating expenses:</u>						
Livestock	55	20	14	11	8	2
Crops	289	188	59	17	10	15
Labor	6	--	1	1	2	2
<u>Other:</u>	201	77	23	28	33	40
<u>Personal:</u>	<u>96</u>	<u>3</u>	<u>1</u>	<u>7</u>	<u>79</u>	<u>6</u>
TOTAL	1018	434	147	115	238	84

Farm Power Utilization

Available power is an important determinate of the size of farm business that one farm family can adequately care for. Hand methods of work, particularly in relation to specific land tilling practices soon limit the number of hectares that one man can till. Animal power for the more difficult tasks can greatly increase the productive capacity of each individual farm laborer. Mechanized power creates even greater increases in labor productivity. However, power is rarely productive in an of itself. It is generally a direct substitute for labor. Thus, in most cases it has economic relevance, only in situations where labor is in insufficient supply.

The agricultural of southern Brazil, in keeping with its diversity in size and type of farm operation, also exhibits a wide variation in the quantity and form of power utilized on farms. Mechanized power in the form of tractors was found on ten percent of the farms interviewed. These tractors were concentrated in the medium and large farm areas of the municipios of Carazinho and Alegrete (Table 12). Alternatively, they were located in the range livestock, and mechanized crop farm areas. The remainder of the farms employed some form of animal power or relied entirely on human labor for farm tasks. Eighty-three and seven percent of the observations were included respectively in the last two power categories.

Each farm with some form of either animal or mechanical power was rated in terms of the quantity of power available on the farm.

To compare farms employing power of different types a concept of power unit equivalent was employed. A power unit is defined as equal to one team of oxen, one horse or mule, or 5 hp of mechanized power. The large number of animal power units found on range livestock farms is composed primarily of horses, the use of which may not be directly compared with farms having a heavy tractive power requirement. Most common are farms with one or two power equivalents, i. e., one or two teams of oxen. However, a fairly large number of farms do employ multiple animal power units.

The great range in number of power units on these farms, from no power on some to in excess of 100 units on others, coupled with the wide diversity in farm size and enterprise relationship presents an unusual opportunity to examine the needs and use of power on farms under widely different conditions.

Table 12

Number and Type of Power Units Per Farm By Municipio
954 Farms -- Southern Brazil -- 1965

Number of power units*	M u n i c i p i o								
	All	Alegrete	Carazinho	Ibiruba	Lageado	Tubarao	Concordia	Timbo	Itapentininga
	(Number of observations)								
No power	62	7	--	7	12	16	10	10	--
Animal power	793	67	56	107	114	89	123	118	119
1	273	38	1	70	52	38	29	43	2
2	227	20	1	30	31	26	51	49	19
3	103	6	1	6	17	10	34	17	12
4-6	77	3	3	1	12	10	8	8	32
7-14	64	--	15	--	2	5	1	1	40
15 or more	49	--	35	--	--	--	--	--	14
Mechanical power**	99	35	29	10	1	7	--	4	13
1-4	5	--	2	1	--	--	--	--	2
5-9	45	11 (7)	16	6 (5)	1 (1)	4 (3)	--	4 (2)	3
10-14	16	4 (8)	1 (1)	3 (4)	--	1 (1)	--	-- (2)	7 (4)
15-19	11	6 (3)	4	-- (1)	--	-- (1)	--	--	1 (4)
20 or more	22	14 (17)	6 (28)	--	--	2 (2)	--	--	-- (5)
Total farms	954	109	85	124	127	112	133	132	132

* One power unit is equivalent to one horse, two oxen or 5 hp of mechanized power.

** Mechanized power only. Numbers in () refer to total power units on farms including both animal and mechanized.

SUMMARY

The formulation of meaningful policies applicable to agricultural development depend on an intimate knowledge of the structure and processes in the agricultural sector. The wide differences in the characteristics of individual farms and between farm type groups within one region of a developing agriculture, here represented by southern Brazil, demonstrate that the formulation of effective agricultural policy is not an easy task.

Farm sizes range from a few hectares to several thousands of hectares. Technology levels from hand methods of work to the most modern of mechanized power units are found on neighboring farms, indicating a tremendous range of difference in the form and intensity of use of capital and labor inputs in agriculture. Differences in the level of utilization of other forms of technology are equally apparent.

Market orientation runs the gamut from subsistence oriented farming to highly commercialized agricultural production units. Farm investment and income patterns show similar differences. External sources of capital utilized by farm operators are principally government oriented. This indicates a dependence of farmers on the government for investment capital in agriculture, and perhaps a positive tool for bringing about desired changes in the capital structure of agriculture. However, the fact that government credit is closely tied to subsidized interest rates, may indicate a general lack of profitability of additional capital in agriculture.

This wide diversity in the structure and organization of agricultural units and the questionable profitability of both internal and external investment present a challenge to the policy maker and an opportunity to the researcher to more fully understand the complex nature of agricultural development.

PROPOSED RESEARCH AREAS

The research needed at the farm level in developing countries can be approached in two ways: (1) an analysis of specific factors that will make agricultural development program implementation more effective, and (2) a more fundamental examination of the basic assumptions about developing agriculture on which development efforts are presently based to determine the degree and extent of applicability of these assumptions to real farm situations. These are not necessarily separate research objectives. However, a failure to investigate the basic assumptions about the characteristics of developing agriculture, may result in only a modest improvement in existing programs and may miss some real opportunities from possible reorientation of development efforts. It is not enough to determine which capital inputs are the most productive. The question of whether capital is in fact a bottleneck to further development must also be investigated. For example, furnishing additional capital to agriculture when it is already disposing of its savings in non-agricultural pursuits would probably indicate a misdirection of efforts.

The following research areas are subjects for specific studies, initially using the farm level data from southern Brazil described in this report. The problems to be studied are varied and complex. Information collected at the farm level in developing countries does not, however, have the same record keeping base as that collected in more developed countries. Thus, these initial studies, in addition

to seeking answers to specific problems, will be a test of the applicability of some of the more refined analytical techniques to cross sectional data collected on a recall basis.

The Role of Capital in Agricultural Development

1) The determination of high return inputs

Special development programs are often directed toward stimulating the use of certain capital inputs or the production of specific crops. Special agricultural credit policies for fertilizer purchase, acquisition of machinery, purchase of improved animals and other specific uses are all examples of policy attempts to influence the farmer in his allocation of capital inputs. These all presuppose a superior knowledge on the part of policy makers as to the best allocation of resources at the farm level. Several studies will be made to determine which capital inputs provide the greatest return under specific situations of farm size, enterprise combination and resource use. Further, if possible, an attempt will be made to determine not only the return under an average situation but to delineate the range of resource use that is profitable.

2) Capital formation on farms, including a study of consumption and saving by farm families

An implied assumption of programs designed to increase the flow of external capital to farms is that the internal rate of saving is insufficient to support new capital investments. Profitable new investments should lead to greater income, thus more savings and

greater possibility for future internal capital formation. Little is known, however, about the use by farmers of their net income or how consumption patterns vary based on income and other variables. This study will examine income and consumption patterns of farm families and relate this to internal rates of capital formation.

3) Utilization of external capital (credit) by farmers

Utilization of credit by farmers in a capital short environment is a factor both of the farmers independent decisions and of the lending policies of the credit institutions. The latter may reflect either governmental development policy and/or specific lending practices of private institutions. Presumably, where effective demand is greater than supply the allocative process will be determined to a greater extent by the sources of supply. That is, the lending institutions will be able to allocate credit to those farmers they feel better serve the interests of the bank. Under standard banking procedures, this would probably include as first priority relatively large loans to established farmers with a strong equity base to serve as collateral for the loan. This may or may not be compatible with the social optimum use of external capital in agriculture based on production response and the availability of internally generated investment funds. This study will be largely descriptive, looking at credit use by source of credit, fund use and characteristics of recipients.

4) The economic environment facing commercial farmers including a study of relative prices and inflation

Limited capital use by farmers may be a result of shortage of capital. It may alternatively indicate that additional capital is not profitable or not sufficiently profitable to stimulate farmers to make permanent improvements in their productive resources under conditions of uncertainty due to price changes and inflation. Further, it is not known to what extent farmers perceive of the nature of inflation and how their perception of inflation is reflected in their decisions regarding investments. Do farmers fail to invest because they lack savings or because they feel new capital investments are unprofitable or because off-farm investments are more profitable?

Brazil has experienced a period of substantial and changing rates of inflation over the past few years. This study will examine the price patterns of various key farm inputs and farm products in relation to each other and to changes in the general price level. Farmers' reaction in terms of investment decisions and in their attitudes toward, and understanding of, the process of inflation will also be examined.

Tenure and Farm Size

1) Relationship of type of farming and farm size to labor and power requirements on farms

There is great variability in Southern Brazil in size of farm, both within and between type of farming regions. Farm size differences have a significant effect on the potential productivity of family labor, especially on smaller farms. As farm size increases, hand methods of work soon limit the amount of land one man can adequately care for. Systems of animal and mechanized power then become the factors determining the degree of intensity of land use on larger family farms.

Power sources, especially in the case of mechanized power are lumpy non-divisible inputs. They also require a complementary equipment component that further increases the cost and therefore the necessary return from their employment in the farm operation. Thus, their application raises serious questions of economies of size.

This study will analyze the use of power on farms of different sizes and types and attempt to determine the relationship between farm size and power needs, including the labor component.

Management

1) The relationship of management level to capital use intensity and productivity.

Superior management becomes more important as increasingly sophisticated technological inputs are employed in agricultural production and farmers become more market oriented. The need to balance cost against expected returns, consider several alternatives, apply complicated inputs and accept the added risks of market dependence place a greater burden on the management function.

Many feel that the introduction of new technology, credit and other methods of raising agricultural productivity are not feasible policy alternatives unless accompanied with management training. It is assumed that the farmer either will not be able to use the new technology without further training or will perform so poorly that it will not prove profitable for him.

Empirical evidence on the importance of the management function in developing agriculture is lacking. Studies, in the more developed countries have indicated that the identification of good managers and measurement of the contribution of management to levels of productivity in agriculture is a difficult task.

This study will attempt to delineate a method for identifying superior management performance and measure the effect of different management levels on the intensity of use and productivity of capital. Initially, only one type of farming will be considered, thus the study will concentrate on the operational aspects of management.

BIBLIOGRAPHY

- 1) Erven, Bernard, an Economic Analysis of Agricultural Credit Use and Policy Problems - Rio Grande do Sul, Brazil, Unpublished Ph.D. dissertation, University of Wisconsin, Madison, Wisconsin, 1967.
- 2) Gastal, E. Et al, Estudo de Administracao Rural em Pelotas - RGS Associacao Sulina de Credito e Assistencia Rural - ASCAR, Porto Alegre, Rio Grande do Sul, Brazil, 1961.
- 3) _____, Estudo de Administracao Rural em Ibiruba, RGS - ASCR, Porto Alegre, Brazil, 1965.
- 4) Nicholls, William H. and Paiva, Ruy Miller - Ninety-Nine Fazendas: The Structure and Productivity of Brazilian Agriculture, 1963. Graduate Center for Latin American Studies, Vanderbilt University, Nashville, Tennessee.
- 5) Rask, Norman, Tamanho da Propriedade e Renda Agricola - Santa Cruz do Sul, Instituto de Estudos e Pesquisas Economicos, Faculdade de Ciencias Economicos, Universidade do Rio Grande do Sul, Porto Alegre, Brazil, 1965.
- 6) _____, Tamanho Minimo e Combinacoes de Atividades para Pequenas Propriedades RGS, Instituto de Estudos e Pesquisas Economicos, Faculdade de Ciencias Economicos, Universidade do Rio Grande do Sul, Porto Alegre, Brazil, 1965.
- 7) Sa, Jose Itamar, Utilizacao da Mao de Obra e Niveis de Renda em Pequenas Propriedades Rurais - Santa Rosa - RGS, Instituto de Estudos e Pesquisas Economicos, Faculdade de Ciencias Economicos, Universidade do Rio Grande do Sul, Porto Alegre, Brazil, 1965.
- 8) Schultz, Theodore W., Economic Growth Theory and the Profitability of Farming in Latin America. Paper presented at the Meeting of the Board of Governors, Inter-American Development Bank, Washington, D. C., April, 1967.
- 9) Sorenson, Donald Et al, An Evaluation of The CNCR Fertilizer Loan Program In Brazil, AFC Research Report 118, Department of Agricultural Economics and Rural Sociology, The Ohio State University, Columbus, Ohio, 1967.